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10/668,702	09/23/2003	Keng-Chu Lin	24061.22	2195

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EXAMINER

GEBREMARIAM, SAMUEL A

ART UNIT	PAPER NUMBER
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2811

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/668,702

Applicant(s)

LIN ET AL

Examiner

Samuel A Gebremariam

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of group I, claims 1-17 in the reply filed on 10/25/04 is acknowledged. The traversal is on the ground(s) that the embodiments delineated by the examiner are not patentably distinct. This is not found persuasive because applicant does not provide a reason as to why the restriction requirement is improper.

A restriction requirement between one set of product claims and a set of process claims was issued in the Office action mailed on 9/23/04. "Section 121 [of Title 35 USC] permits a restriction for 'independent and distinct inventions,' which the PTO construes to mean that the sets of claims must be drawn to separately patentable inventions." See *Applied Materials Inc. v. Advanced Semiconductor Materials* 40 USPQ2d 1481, 1492 (Fed. Cir 1996)(Archer, C.J., concurring in-part and dissenting in-part). A product and the process of making the product are "two independent, albeit related inventions." See *In re Taylor*, 149 USPQ 615, 617 (CCPA 1966). "When two sets of claims filed in the same application are patentably distinct or represent independent inventions, the examiner is to issue a restriction requirement." See *In re Berg*, 46 USPQ2d 1226, 1233 n.10 (Fed. Cir. 1998).

The examiner, in issuing a restriction requirement, must demonstrate "one way distinctiveness." *Applied Materials Inc.* at 1492. As stated within the restriction requirement, "inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product

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or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)).” In this application, the examiner restricted the product claims from the process claims on the grounds that “the product as claimed can be made by another and materially different process such as a process wherein forming the second layer separately and bonding the second layer onto the inter-treated glue layer instead of depositing the second layer onto the inter-treated glue layer,” and that, as a result, a restriction was necessary.

In addition to one way distinctiveness, the examiner must show “why it would be a burden to examine both sets of claims.” *Applied Materials Inc.* at 1492. “A serious burden on the examiner may be *prima facie* shown if the examiner shows by appropriate explanation either separate classification, separate status in the art, or a different field of search.” MPEP 803. An explanation was provided in the restriction requirement. Specifically, in addition to being distinct, the examiner indicated that restriction is proper because the product claims and the process claims “have acquired a separate status in the art.”

The criteria of distinctness and burdensomeness have been met, as demonstrated hereinabove. Accordingly, the restriction requirement in this application is still deemed proper and is therefore **made FINAL**.

Claims 18-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention, the requirement having been in the reply to the office election that was mailed 9/23/04. The requirement is still deemed proper and is therefore made FINAL.

Specification

2. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification has support for a glue layer. But the specification does not have support for the limitation of "a glue for the glue layer" as recited in claim 16.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The scope of claim 12 is unclear because it is not clear what applicant is trying to say when stating, "selecting a glue for the glue layer".

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

6. Claims 1, 3-5, 12-14, 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Chooi et al., US patent No. 6,566,260.

Regarding claim 1, Chooi teaches (figs. 15-20) a semiconductor device having a first layer (12) underlying a second layer (16), the method comprising: forming a glue layer on the first layer (14); performing an inter-treatment on the glue layer (15); and depositing the second layer (16) onto the inter-treated glue layer (14).

The limitations of "a method for increasing a time dependent dielectric breakdown lifetime of a semiconductor device" or "the inter-treatment improves an interface between the glue layer and the first layer" are not given patentable weight because a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Regarding claim 3, Chooi teaches the entire claimed process of claim 1 above including the inter-treatment on the glue layer includes applying plasma to the glue layer (col. 9, lines 46-55).

Regarding claim 4, Chooi teaches the entire claimed process of claim 1 above including selecting a reacting gas, a process time, a process temperature, a process pressure, and a reacting gas flow (refer to col. 46-55). Chooi teaches performing plasma treatment on layer (14) using different gases in a chamber at certain pressure.

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Chooi's process inherently requires adjusting reacting gas flow as indicated by the chemical formula, chamber temperature and process time.

Regarding claim 5, Chooi teaches the entire claimed process of claim 1 above including the selected reacting gas is a hydrogen based gas (col. 9, lines 46-55).

Regarding claim 12, Chooi teaches the entire claimed process of claim 1 above including (figs. 15-20) depositing a dielectric layer (12); depositing a glue layer (14) on the dielectric layer; and applying a plasma treatment process to the glue layer (col. 9, lines 46-55).

Regarding claim 13, Chooi teaches the entire claimed process of claim 1 above including a glue layer with a certain thickness.

The limitation "the selected thickness is based at least partially on a desired electrical property of the glue layer" is not given patentable weight because the feature does not add anything to the process of forming the glue layer. Furthermore since Chooi is concerned with forming interconnection structure therefore Chooi's process is inherently concerned with finding the desired electrical property of the glue layer.

Regarding claim 14, Chooi teaches the entire claimed process of claim 1 above including adjusting a property of the selected treatment process based on the selected thickness of the glue layer.

Chooi teaches forming the treatment over a certain depth of the glue layer (14, fig. 16). Therefore Chooi is inherently capable of adjusting a property of the selected treatment process based on the selected thickness of the glue layer.

Regarding claim 16, Chooi teaches the entire claimed process of claims 1 and 12 above including the glue layer is silicon oxide (FSG, col. 9, lines 40-45).

Regarding claim 17, Chooi teaches the entire claimed process of claims 1 and 12 above including the selected process is the plasma treatment process, and wherein a reacting gas to be used in the plasma treatment process is hydrogen based gas (col. 9, lines 46-55).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chooi in view of Cox et al. US patent No. 5,851,927.

Chooi teaches substantially the entire claimed process of claim 1 above except explicitly stating performing a pre-treatment on the first layer before forming the glue layer.

It is conventional and also taught by Cox teaches performing a pre-treatment process on a silicon nitride film (col. 3, lines 15-32) in order to promote adhesion between the silicon nitride layer and subsequent layers.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the pretreatment process taught by Cox in the method of Chooi in to promote adhesion between the first layer and the glue layer.

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9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chooi in view of Xia et al. US patent No. 6,261,975.

Chooi teaches substantially the entire claimed process of claims 1 and 4 above except explicitly stating that the selected reacting gas is a helium based gas.

It is conventional and also taught by Xia using helium based gas in the process of forming silicon oxide layer with an improved and stable layer (col. 8, lines 12-29).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the helium based gas taught by Xia in the process Chooi in order to form glue layer that is stable (col. 8, lines 12-29).

10. Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chooi.

Regarding claim 7, Chooi teaches substantially the entire claimed process of claims 1 and 4 above except explicitly stating that the selected process time is between approximately 1 and 100 seconds, the selected process temperature is between approximately 200 and 400° C, the selected process pressure is between approximately 0.5 and 10 torr, and the selected reacting gas flow is between approximately 100 and 2500 sccm.

Parameters such as process time, temperature, pressure and reacting gas flow in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired film quality during device fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made adjust the process time, temperature, pressure and flow as claimed in the process of Chooi in order to form a high quality glue layer.

Regarding claim 15, Chooi teaches substantially the entire claimed process of claims 1 and 14 above except explicitly stating duration of the selected treatment process.

Parameters such as process time are subject to routine experimentation and optimization to achieve the desired film quality during device fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made adjust the process time as claimed in the process of Chooi in order to form a high quality glue layer.

11. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chooi in view of Murokh et al. US patent No. 5,798,146.

Regarding claim 8, Chooi teaches substantially the entire claimed process of claim 1 above except explicitly stating that performing the inter-treatment on the glue layer includes directing an electron beam towards the glue layer.

Murokh teaches (col. 1, lines 34-46) the application of electron beam on a dielectric layer in order to improve to the wettability and adhesive characteristics.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the process of applying electron beam on the dielectric layer taught by Murokh in the process of Chooi in order to improve the adhesive characteristics of the glue layer.

Regarding claim 9, Chooi teaches substantially the entire claimed process of claims 1 and 8 above including directing the electron beam towards the glue layer further comprises defining a process power and a dosage. Since applying electron beam requires using a certain amount of process power and electron beam density, the combined process of Chooi and Murokh inherently teaches defining a process power and a dosage.

Regarding claims 10 and 11, Chooi teaches substantially the entire claimed process of claims 1 and 8 above except explicitly stating that the process power is between approximately 1000 eV and 8000 eV and the dosage is between approximately 50 and 500 $\mu\text{C}/\text{cm}^2$.

Parameters such as process power and electron beam dosage in the art of semiconductor manufacturing process are subject to routine experimentation and optimization to achieve the desired film quality during device fabrication.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made adjust the process power and beam dosage as claimed in the process of Chooi in order to order to improve the adhesive characteristics of the glue layer.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A Gebremariam whose telephone number is (571) 272-1653. The examiner can normally be reached on 8:00am-4:30pm.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAG

November 26, 2004



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